DOWEL BAR RETROFIT MSP-04-04

1.0 Description of Work. This work shall consist of sawing partial depth slots across cracks, cleaning the slots, placing dowel bars in the slots, placing a joint forming insert to reestablish the crack and backfilling the slots with concrete as shown in Fig 1.

2.0 Material.

2.1 Repair Material. Rapid set concrete patching material shall be used. Prior to use, the material shall be approved by Construction and Materials. Material having completed current testing through AASHTO's NTPEP will be considered for qualification upon submittal of a written request by the manufacturer with accompanying documentation. The material shall be handled, prepared and mixed in accordance with the manufacturer's recommendations. The contractor shall supply a manufacturer's certification to the engineer for each lot of material furnished. The certification shall include the name of the manufacturer and a manufacturer certification statement that the material supplied is the same as the material that was qualified.

2.2 Dowel Bars. Dowel bars shall be 1 1/2 x 18 inches (38 x 450 mm) and in accordance with Sec 1057, except the entire dowel bar shall be coated.

2.3 Expansion Caps for Dowel Bars. Caps shall be tight fitting and made of 1/4-inch (6 mm) thick non-metallic material that will allow 1/4 inch (6 mm) movement at each end of the dowel bar.

2.4 Joint Insert. To reestablish the crack, a compressible insert shall be used. Compressible inserts shall be rectangular and shall have a minimum thickness of 1/4 inch (6 mm). The material shall be preformed fiber expansion joint filler in accordance with Sec 1057 or, if approved by the engineer, styrofoam or asphalt-impregnated fiberboard. The material shall fit tight around the dowel bar and to the bottom and edges of the slot. The material shall be capable of remaining in a vertical position and tight to all edges during placement of the repair material to prevent the concrete backfill from flowing into the existing crack and pavement voids.

2.5 Bar Chairs. Bar chairs may be metal epoxy-coated chairs or a non-metallic material.

3.0 Construction Requirements.

3.1 Preparation of Slots. Two saw cuts shall be made in the pavement to outline the longitudinal sides of each dowel bar slot. The slots shall be sawed to a depth and length that allows the center of the dowel to be placed at mid-depth in the pavement slab. The slots shall be 2 1/2 to 4 inches (63 to 100 mm) wide. The contractor shall provide a method, approved by the engineer, that will align the slots parallel to centerline of the roadway with a maximum variation of 1/8 inch (3 mm) from a true parallel line. Slots in a wheel path shall be created by using saws with gang-mounted diamond blades, capable of simultaneously making six saw cuts for three dowel bar slots at the desired slot spacing. Equipment shall not cause damage to the existing pavement. All saw slurry shall be removed from the slot and pavement. No water residue or paste shall be allowed to flow onto lanes open to traffic or into closed drainage systems. Pneumatic hammers used to remove the concrete remaining between the saw cuts shall not be larger than 15 pounds (7 kg). If the concrete removal operations cause damage to pavement that is to remain, the concrete removal operations shall be discontinued and shall not resume until the contractor has taken corrective measures. The pneumatic hammer will not be

permitted to break through the concrete, and if this occurs, a full depth pavement repair shall be conducted at the contractor's expense. The bottom of slots shall be flat. The edges of the slots shall be cleaned by blasting to produce a rough surface. Blasting operations shall not damage the surrounding pavement. The newly exposed concrete surface shall be free of spalls, burrs, latence and all contaminants detrimental to achieving an adequate bond. The maximum amount of spalling allowed on the edges of the slots will be 3/8 inch (9 mm). Slots shall be long enough to place the dowel bars in the slots without the ends of the bars hitting the curved ends of the saw cut.

3.1.1 After the construction of a slot, the pavement shall not be opened to traffic until all six retrofit dowel bars are in place, cured, and the work is completed at that location. The tires of construction vehicles will not be permitted to travel on slots where concrete has been removed.

3.1.2 Multiple saw cuts parallel to the centerline may be sawed to allow removal of material from the dowel bar slots and to provide a level surface for the feet of the dowel bar chairs.

3.1.3 All slots shall be cleaned with moisture-free, oil-free, compressed air to remove any remaining dust, residue, debris and moisture. The contractor shall then seal the existing transverse joint and all cracks at the bottom and the sides of the dowel bar slot with an approved caulking sealant to prevent any repair material from entering into these areas.

3.2 Placement of Dowel Bars, Joint Inserts and Repair Material.

3.2.1 Prior to inserting a dowel bar in a slot, expansion caps shall be placed on each end of the bar. A dowel bar chair shall hold the bar firmly centered in the slot and at a minimum of 1/2 inch (13 mm) above the bottom of the dowel slot. The dowel bar chairs shall not allow movement of the dowel.

3.2.2 When placing the dowel bar in the slot, care shall be taken to avoid getting any graphite grease onto the sides or bottom of the slot. If the debonding agent on the dowel bar contaminates any of the surfaces of the slot, the dowel bar shall be removed and the slot sandblasted to remove the contamination.

3.2.3 The dowel bar shall be inserted into the slot such that the chair legs are in the saw cut kerfs at the bottom of the slot. The bars shall vary no more than 1/4 inch (6 mm) from the pavement surface and shall be parallel to the centerline of the pavement. Bars shall be firmly centered in the slot at the midpoint of the pavement slab. The legs of the bar chairs shall be snug against the slot wall.

3.2.4 A joint insert shall be placed into the slot as a filler material to maintain the crack as shown on the plans. When in place, the insert shall extend from the bottom of the slot to no more than 1 1/2 inches (38 mm) from the surface of the pavement, with half the dowel length extending on each side of the insert. If for any reason the insert or dowel bars shift during placement of the repair material, the work will be rejected and shall be redone at the contractor's expense.

3.2.5 Just prior to placement of the repair material, one or more passes of an air blast shall be used to provide a dust free, clean slot.

3.2.6 The repair material shall be placed in the slot, consolidated, textured and cured as recommended by the manufacturer.

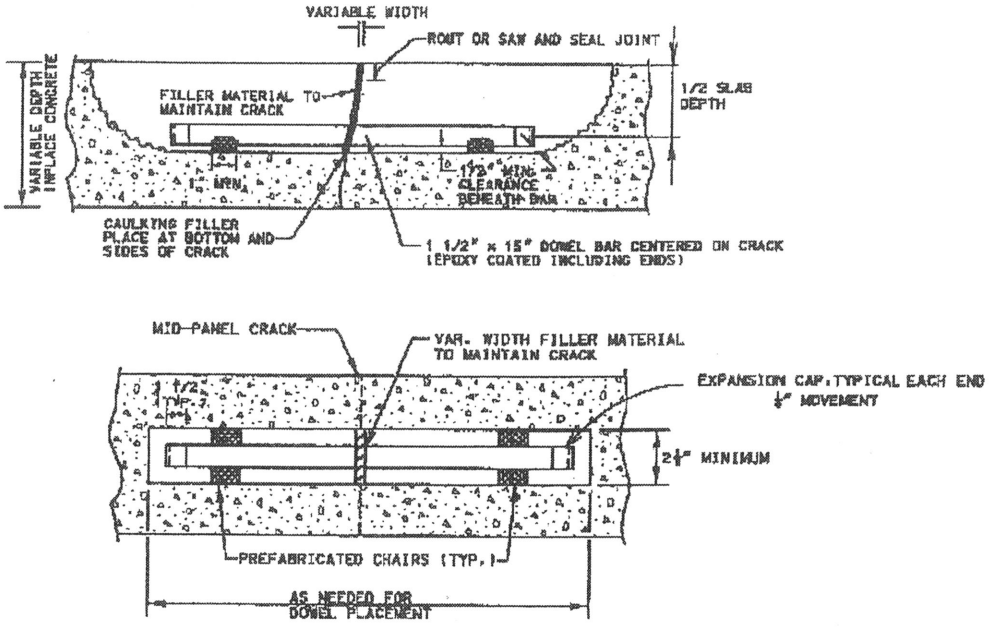
3.3 Resealing Cracks. After the concrete has initial set, the joint insert shall be removed to a minimum depth of 3/8 inch (9 mm) below the pavement surface by sawing. The reservoir shall then be filled with hot-poured, elastic-type, concrete joint sealer in accordance with Sec 1057.

3.4 Opening to Traffic. Traffic shall not be permitted on the repaired pavement until the rapid set concrete patching material has attained a minimum compressive strength of 1600 psi (11 MPa), but shall be a minimum of 2 hours or the time recommended by the manufacturer.

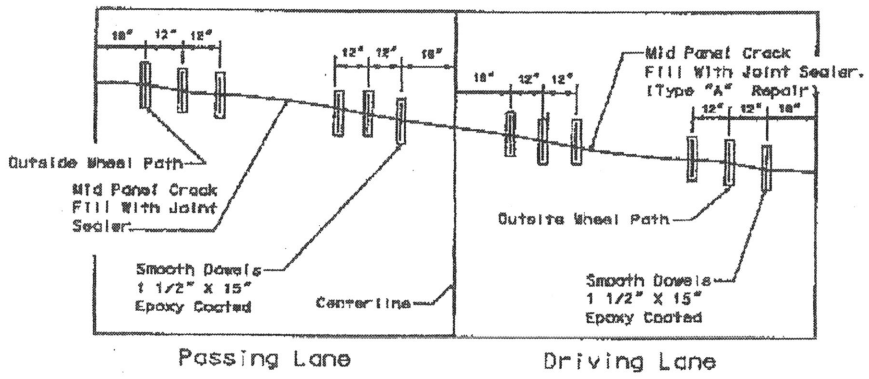
4.0 Basis of Payment. The accepted quantity for dowel bar retrofit will be paid for at the contract unit price per dowel bar, complete and accepted in place.

Figure 1

DOWEL BAR RETROFIT



TYPICAL RETROFIT DOWEL LAYOUT



PLAN OF DOWEL BAR REPLACEMENT

NOTE:
AFTER THE DOWEL BAR RETROFIT IS COMPLETED, THE EXISTING CRACK SHALL BE SEALED.